(4)

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 681 487 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
07.11.2001 Bulletin 2001/45

(21) Application number: **94907901.6**

(22) Date of filing: **01.02.1994**

(51) Int Cl.7: **A61M 5/00**, A61M 5/32, A61M 5/50

(86) International application number:
PCT/US94/00981

(87) International publication number:
WO 94/17843 (18.08.1994 Gazette 1994/19)

(54) HYPODERMIC SYRINGE WITH NEEDLE RETRACTION FEATURE

SPRITZE FÜR SUBKUTANINJEKTIONEN MIT EINER ZURÜCKZIEHBAREN NADEL

SERINGUE HYPODERMIQUE A AIGUILLE RETRACTABLE

(84) Designated Contracting States:
CH DE DK ES FR GB IT LI NL SE

(30) Priority: **01.02.1993 US 11942**

(43) Date of publication of application:
15.11.1995 Bulletin 1995/46

(73) Proprietor: **INNOVA DEVELOPMENT CORPORATION**
Boca Raton, FL 33486 (US)

(72) Inventors:
- **SILVER, Jules**
  Boca Raton, FL 33486 (US)
- **ZIEGLER, Louis, C.**
  Englewood Cliffs, NJ 07632 (US)

(74) Representative: **Weydert, Robert et al**
Dennemeyer & Associates S.A.
P.O. Box 1502
1015 Luxembourg (LU)

(56) References cited:

EP-A- 0 356 810	WO-A-91/12841
US-A- 4 804 370	US-A- 4 904 242
US-A- 5 019 043	US-A- 5 047 016
US-A- 5 085 638	US-A- 5 112 316
US-A- 5 152 750	US-A- 5 211 630
US-A- 5 215 533	US-A- 5 290 233

EP 0 681 487 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] This invention relates to a hypodermic syringe, and more particularly, to a disposable hypodermic syringe having a needle which may be retracted into the cylindrical cavity of the barrel following use.

[0002] A typical hypodermic syringe includes a transparent cylindrical barrel, generally open at a proximal end, a plunger assembly movable within the barrel to dispense medication, and a needle assembly removably attached to the barrel at a distal end by means of a locking mechanism, such as Luer lock. During usage, medication is sealed within open side of the barrel by means of a rubber piston slipped over the distal end of the plunger. At the distal end of the syringe, sealing is accomplished through a sealant, such as an epoxy resin, extending berwoen the outer surface of the needle and the lock hub carrying the needle. This sealant, and the locking mechanism fastening the needle assembly to the barrel, are also used to transmit the force, which may be as high as several pounds, required to insert the needle into the patient's body and to remove the needle after the injection process is complete.

[0003] The applications of hypodermic syringes within a health care facility require the availability of syringes varying particularly in needle length and diameter, and in the dosage capacity of the barrel. To satisfy this need, needles and the remaining portions of syringes arc made commercially available both as assembled units, and as separate units allowing the attachment of a selected one of the various needle assemblies to a selected one of various barrels. The Luer lock fittings used to fasten the needle to the barrel form a basis for common, interchangeable parts.

[0004] It is thus desirable that any improved design for hypodermic syringes should include the capability of switching needles among the syringes. It is even more desirable that any improved design for hypodermic syringes should be capable of using standard needle assemblies, and that the new needle assemblies should be usable in standard syringe barrels.

[0005] Modern medical practice dictates that, in order to eliminate a possible source of contagious disease, hypodermic syringes are used only once. There is a growing concern, even when syringes are discarded immediately after use, that health care workers may be accidently stuck by a hypodermic needle which has been used in the treatment of a patient having a serious communicable disease, such as AIDS or hepatitis. Used hypodermic needles have become an especially dangerous form of waste material, posing a danger to anyone handling trash from a health care facility and to anyone who might come into contact with such material after it has been dumped, and requiring special puncture resistant containers for disposal.

[0006] Another problem commonly associated with discarded hypodermic syringes is their potential use by drug abusers, who sometimes search waste material from health facilities for such devices. This practice obviously carries a significant risk of infection to these drug users and to others they may subsequently contact.

[0007] Conventional hypodermic syringes included an inward extending ring near the proximal opening of the barrel, which forms a stop, preventing the inadvertent removal of the plunger from the barrel. However, this ring is generally not rigid enough to prevent the deliberate, surreptitious removal of the plunger, as by a drug abuser.

[0008] One prior art solution to the aforementioned problems has been to enclose the needle in a sheath manually slipped over the needle end before and after use of the syringe. However, this technique still exposes health workers to the risk of being stuck with an infected needle as the sheath is slipped on, particularly when the needle is not properly aligned with the sheath opening. Furthermore, this technique does nothing to render the syringe useless to a drug abuser.

[0009] Another prior art solution to the aforementioned problems is breaking the needle from the syringe once it is used. While this procedure is followed in a number of health care facilities, there are still several disadvantages to this procedure. First, the broken needles are not necessarily enclosed in a way permitting their subsequent safe handling, and second, the additional handling of used needles by health care workers in the process of breaking the needles may increase the risk of their being accidently stuck by an infected needle.

[0010] One attractive solution to the aforementioned problems is in providing a syringe/needle assembly in which the needle may be retracted into the barrel of the syringe after use, so that the needle is held in an envelope formed by the barrel during disposal. The patent literature includes descriptions of devices of a first general type, in which a needle is fastened to a needle carrier which travels axially within the barrel. In its distal position, the carrier holds the needle ready for use at the distal end of the barrel. After the plunger assembly is moved to the distal end of the barrel, after dispensing the desired medication, the plunger assembly engages and locks onto the needle carrier. When the plunger assembly is subsequently withdrawn and returned to the proximal end of its travel, the needle is carried with the plunger until it is completely enclosed within the barrel. At this point, the syringe is ready for proper and safe disposal. Examples of syringes of this type are found in U.S. Patent 4,710,170, issued to Haber et al on December 1, 1987; in U.S. Patent 4,790,822, issued to Haining on December 13, 1988; and in U.S. Patent 4,883,471, issued to Braginetz et al on November 28, 1989.

[0011] In the prior art devices, the needle is fastened to the needle carrier by conventional means. For example, needle may be fastened to a Luer lock hub, which, in turn, is screwed onto a threaded hole forming internal surfaces in the needle carrier. Thus, syringes of this kind have the advantage of being capable of using standard needle assemblies of the types widely available for sy-

ringes not incorporating the safety feature of needle retraction. If the syringe is provided with its needle carrier at the distal position, an interchangeable needle may be screwed into the syringe from the distal end, in the conventional manner. However, the barrels of syringes of this type, of necessity, have relatively large openings at their distal ends, to accommodate the motion of the needle, together with a portion of the needle carrier as it is retracted into the barrel. This large opening, in turn, significantly increases the complexity and cost of the device by requiring fluid tight sealing around the outside of the needle carrier, so that medicine can be dispensed through the needle without leakage out of the distal end of the syringe.

[0012] Furthermore, the needle carrier of the prior art devices occupies a significant portion of the axial length of the barrel. The conservation of distance along this length is especially important in a syringe having a retractable needle because the space is needed for storage of the needle after use. Conventional syringes are built to particular sizes for convenient handling and use, as well as for various barrel capacities for medication. For example, the barrels of typical syringes having either three cubic centimeter and five cubic centimeter capacities are about 63.5mm (2.5 inches) in length, with the difference in capacity being accomplished by varying the diameter. A typical long needle extends 38 mm (1.5 inches) from the end of the Luer hub to which it is attached. Including this hub, the length of the needle assembly is about 54 mm (2.125 inches). Thus, the use of a needle carrier of the prior art requires lengthening the barrel beyond the length necessary for handling and capacity, thereby decreasing the ease and familiarity with which the syringe is handled and further increasing its costs of manufacture and distribution.

[0013] The device of U.S. Patent 4,883,471 to Braginetz et al mounts the needle carrier in a second piston. After the medication is dispensed, vent ports are opened by rotating a cap at the distal end of the syringe, so that the atmosphere is allowed to enter the syringe at the distal end of this second piston. The retraction of the piston, with the needle, is then accomplished by the differential pressure established as the plunger is withdrawn. However, rotating the cap in this way presents the health care worker with the inconvenience of an extra step in the process.

[0014] The patent literature also describes devices of a second general type, in which the needle assembly is loaded into the syringe barrel from inside the barrel, to stick outward through a relatively small opening in the distal end of the barrel. After the injection of medicine by means of the plunger assembly, the needle assembly is attached to the distal end of the plunger assembly to be retracted into the syringe barrel as the plunger assembly is pulled back toward the proximal end of the barrel.

[0015] While syringes of this type address the concerns expressed above relative to the use of a separate needle carrier, they lack the important ability to use conventional needle assemblies, which are adapted to be screwed into place using Luer couplings from outside the distal end of the barrel. In addition, if interchangeable needles are to be used in any way on the syringes, they must be attached by relatively difficult or complex means within the barrels. Further, by changing a needle through the barrel, the sterility of the barrel can be violated.

[0016] Some devices of this second general type, in which the needle is loaded from inside the barrel, include couplings between the needle assemblies and the distal ends of the barrels, which are connected and disconnected by the rotation of the needle assembly within the barrel, being described, for example, in U.S. Patent 4,507,117, issued to Vining et al on March 26, 1985; in U.S. Patent 4,675,005, issued to DeLuccia on June 23, 1987; in U.S. Patent 4,747,830, issued to Gloyer et al on May 31, 1988; in U.S. Patent 4,919,652, issued to Alter et al on April 24, 1990; and in U.S. Patent 4,986,813, issued to Blake III et al on January 22, 1991. While DeLuccia, Alter, and Blake III teach the use of threaded screw connections, Vining and Gloyer uses quick release, quarter turn types of connection. Vining also describes means for providing the syringe, before use, with the needle retracted for safe handling. A disadvantage of these syringes is the additional requirement that the plunger must be twisted after an injection is given, before disposal of the syringe with the needle assembly in a retracted position. This twisting is needed to engage the needle assembly to the plunger assembly, and to disengage the needle assembly from the distal end of the barrel. However, this requirement places a burden on health care workers in an emergency situation, and can be expected to result in a failure to properly retract needles in some units before disposal.

[0017] Other devices of this in which the needle is loaded through the barrel interior include means for engaging the proximal end of the needle assembly with a mechanism extending from the distal end of the plunger assembly as the plunger mechanism reaches the distal end of its travel in dispensing medicine through the needle. Such devices are described, for example, in one of the embodiments of U.S. Patent 4,675,005 to DeLuccia; in one of the embodiments of U.S. Patent 4,692,156 to Haller; and in U.S. Patent 4,804,370, issued to Haber et al on February 14, 1989. In this Haber device, the needle extends outward through a small hole at the distal tip of the syringe barrel. The proximal end of the needle is provided with a flange, and the plunger assembly is provided with a needle capturing receptacle which engages this flange as the plunger assembly is moved to the distal end of the barrel, so that the needle is subsequently retracted into the barrel as the plunger assembly is withdrawn.

[0018] While such devices are operable without requiring the additional step of twisting the plunger after medicine is dispensed, they are still inconvenient to use,

when compared to conventional syringes, because they do not accept conventional needle assemblies, and because, if it is necessary to install any type of needle assembly, the installation procedure is relatively complex and would violate the integrity of the sterility.

[0019] An important consideration in the design of a hypodermic syringe is the ability of the device to transmit axial forces to the needle from the barrel and plunger. Forces as high as several pounds may be required, both to insert the needle into the patient, and to withdraw the needle from the patient during the process of giving an injection. If the needle is to be retracted into the barrel of the syringe, means must be provided to prevent this retraction during the insertion of the needle into the patient, due to the necessary application of force to the needle as it is inserted.

[0020] In the devices having needle assemblies connected to the barrels with screw threads or quarter turn fasteners, to be disconnected by rotation of the plunger after the medication is dispensed, these fasteners prevent premature retraction of the needle. These devices are shown, for example, in U.S. Patents 4,507,117, 4,675,005, 4,747,830, 4,919,652, and 4,986,813. While this method of holding the needle in place during injection is quite effective, the disadvantages of requiring the performance of the additional manual rotation step and non-standard components remains.

[0021] In those devices having means for engaging the proximal end of the needle assembly with a mechanism extending from the distal end of the plunger assembly, the connection between the needle and the barrel must be strong enough to hold the needle in place as it is inserted into the patient. Further, the needle must subsequently be pulled directly out of this connection for retraction. Both of these actions are accomplished by applying an axial force to the needle. In the devices of U.S. Patent 4,692,156 to Haller, the needle is mounted in an aperture within a deformable tapered mounting post, which deforms to slide through a passage in the barrel during retraction. In other devices, as shown, for example in U.S. Patents 4,804,370 and 4,826,484 to Haber et al., the needle is retained by a tight fit within a distal hole of the barrel. This means that, for reliable operation, the force which must be applied for needle retraction, to overcome the attachment between the needle and the barrel, must be greater than the highest force expected during the insertion of the needle into the patient, together with a safety factor applied to cover variations in the process of manufacturing the syringe. If the needle is to be retracted during withdrawal from the patient, this force must be even higher. The requirement to apply such a large force places a significant burden on health care personnel and creates a potential danger to the patient.

[0022] The device described in U.S. Patent 4,710,170 to Haber et al includes a needle carrier which is held in place within the barrel by means of a quick release fastener. After the dispensing of medication is completed, the plunger is manually rotated to release the carrier from engagement with the barrel. Thus, a requirement to perform an additional step is placed on health care personnel.

[0023] The device described in U.S. Patent 4,790,822 to Haining includes a needle carrier which is held in place at the distal end of the barrel by opposing shoulders extending inward from the interior of the barrel. As the plunger is moved to the distal end of the barrel, a piston at the distal end of the plunger forces these shoulders apart, releasing the carrier to return with the plunger.

[0024] The patent literature also describes apparatus for causing the needle to be rotated transversely, about its attachment to the plunger as it is retracted into the barrel, to point toward a side of the barrel. This is done to prevent accidental or deliberate extension of the needle through the hole in the distal end of the barrel, by means of pushing the plunger inward. In other words, this feature provides further safety for health care and trash disposal workers, and goes another step toward preventing the subsequent use of the syringe by drug abusers. For example, U.S. Patent 4,804,370, issued to Haber et al on February 14, 1989, describes needle capturing receptacle with legs, for capturing a flange at the proximal end of the needle. Two of the legs are shorter than the others, so the needle is rotated transversely as it is retracted. As described in U.S. Patent 4,986,813 to Blake III et al, a syringe includes a fitting fastening the needle assembly to the distal end of the plunger for retraction with a slot, extending inward from one side of the fitting, which is allowed to expand as the needle is fully retracted, throwing the needle out of alignment with the longitudinal axis of the plunger.

[0025] Blake III also describes the use of stopping surfaces extending into the barrel near its proximal end, angled to prevent removal of the plunger from the barrel, while allowing its assembly into the barrel as the syringe is fabricated. Such surfaces make it particularly difficult for a drug user to take the syringe apart to make it again operable or to retrieve the needle.

[0026] Thus, while the feature of needle retraction can be accomplished in a number of ways, the methods proposed in the prior art for providing this feature all have various disadvantages. What is needed is apparatus for providing needle retraction without substantially increasing the size or length of the syringe, as required when a separate needle carrier is employed, and without requiring the performance of an additional step, such as the rotation of the plunger, by health care personnel. Since health care facilities must carry a relatively large inventory of different sizes and types of syringes and needles, it is desirable that an improved syringe should accept the removal and attachment of needles in the standard way, from outside the distal end of the barrel. It is further desirable that the needle be releasibly held in place by positive means, such as a latch or movable abutting surface, rather than by reliance on a tight fit.

Also, since conventional hypodermic syringes are low cost items used in large quantities by health care facilities, it is particularly desirable that the feature of needle retraction should be provided by a mechanism which is inherently simple and low in manufacturing cost. In particular, any improved syringe ideally will use existing syringe parts or slight modified parts so that existing mold tooling can be used.

[0027] The precharacterizing portions of the independent claims 1, 8 and 11 are based on European patent application EP-A-0 356 810 which discloses a syringe requiring the conventional luer lock connection between the needle assembly and the syringe that uses a new needle assembly which requires a metal sheath surrounding the needle and concealing the needle until use at which time the needle is forced from the sheath for purposes of injection. An elastic member in the barrel hub is compressed upon injection and energy is stored therein. Both the sheath and the needle are injected into the patient. When pressure on the needle is released, the elastic member will recover and withdraw the needle into the metal sheath. However, the metal sheath may be contaminated by the retracting needle. The metal sheath may also be contaminated if the sheath is inserted into a patient with the needle. The needle may only be retracted into the sheath a dimension equal to the unstressed dimension of the elastic member less the stressed (compressed) dimension. Neither the needle nor the sheath is retracted into the barrel of the syringe.

[0028] In accordance with one aspect of the invention there is provided a syringe including a barrel member having proximal and distal ends, said barrel member having a luer tip at its distal end defining a channel therethrough in communication with the interior of said barrel member, a plunger slideable in said barrel to force fluid through said passage or to create a vacuum in said barrel, a needle assembly including a hub member slideably receiving a hollow needle therethrough, said needle having a distal piercing end and a proximal end extending into said hub member, said hub member and the distal end of said barrel member having interlocking devices for securing said needle assembly to said barrel member at the distal end of said barrel member with said needle aligned with said passage, characterized in that said needle is slideable in said hub member toward said barrel member and said needle has a collar thereon near the proximal end thereof in said hub member, said collar comprising an outwardly extending flange engaging a wall of said hub member and a needle hub, said luer tip bearing on said flange opposite said wall and being expandable at its distal end to a dimension greater than said flange and an extractor member extending from said plunger adapted to extend through said passage and grasp said needle hub, expand the distal end of said luer tip and grasp said needle hub whereby when said plunger is retracted toward the proximal end of said barrel member said needle is retracted into said barrel.

[0029] In accordance with another aspect of the invention there is provided a syringe having a barrel with a hollow interior and a male luer tip at a distal end of said barrel, said luer tip including a channel extending therethrough characterized by a distal end of said luer tip being expandable from a constricted small diameter to an expanded position wherein the channel opening at said distal end is larger than said constricted small diameter and a member in said syringe barrel movable through said channel into said distal end to expand said constricted distal end.

[0030] In accordance with yet another aspect of the invention there is provided a hypodermic syringe including a needle assembly, said needle assembly including a hub member defining a passage therethrough for a needle, said hub member having a barrel coupling at the proximal end thereof and a wall spaced below said barrel coupling, said barrel having a generally cylindral cavity, a needle attachment coupling at a distal end thereof for attaching said hub member to said barrel, a luer tip at the distal of said barrel and a plunger mounted to slide within said cavity, including a slide, a piston forming a sealing engagement with said cavity, characterized by an enlarged member on said needle comprising a needle flange and a needle hub of lesser diameter than said flange, one side of said flange contacting said wall and preventing movement of said needle toward the distal end of said hub member, the distal end of said luer tip contacting the other side of said flange, said distal end of said luer tip being expandable to a dimension which permits passage of said flange through said channel in said luer tip, an extractor member extending from said slide, said extractor member being arranged to pass through said channel, expand said distal end and grasp said needle hub and retract said needle into said barrel when said slide is retracted.

[0031] Advantageous features of the syringe are recited in the dependent claims.

[0032] Preferred embodiments of the subject invention are hereafter described with specific reference being made to the following Figures, in which:

Figure 1 is an exploded isometric view of a hypodermic syringe built in accordance with the present invention;

Figure 2 is a longitudinal elevation of the syringe of Figure 1, being shown as ready to dispense medication;

Figure 3 is a fractional longitudinal crosssectional elevation of the needle attachment portion of the syringe of Figure 1;

Figure 4 is a cross-sectional elevation similar to Figure 3, shown with the needle engaged for retraction into a barrel of the syringe;

Figure 5 is an elevational view of the proximal end of a needle of the syringe of Figure 1;

Figure 6 is a cross-sectional elevation similar to Figure 2, shown with the needle fully retracted after dispensing medication.

Figure 7 is a fractional longitudinal cross-soctional elevation of a proximal portion of a barrel of a conventional hypodermic syringe, showing a plunger of the syringe pulled outward against a ring used to prevent inadvertent removal of the plunger from the barrel;

Figure 8 is a cross-sectional elevetion similar to Figure 7, showing an improved form of the ring of Figure 7;

Figure 9 is a fractional longitudinal elevation of an alternate structure for gripping a needle for retraction, showing a proximal portion of a needle within a Luer coupling, together with a distal tip of a needle extractor;

Figure 10 is a side view of a syringe useful with the invention which prevents forward movement of the plunger after the needle is withdrawn;

Figure 11 is a side view showing the withdrawn plunger of Figure 10; and

Figure 12 shows another version of the invention.

[0033] Referring first to Figure 1, an improved hypodermic syringe 10 of the subject invention includes a plunger assembly 12 slidable within a barrel 14 to dispense medication by means of a hole extending through a needle 16 within a needle assembly 17. This needle assembly 17 includes needle 16 and a Luer hub 18 by which the needle is removably attached to threaded hole 20 at the distal end of barrel 14. Luer hub 18 includes longitudinally extending external flutes 21, which aid in gripping needle assembly 17 for rotation as required to engage or disengage the threaded Luer connection. Needle assembly 17 may also be provided with a sheath (not shown), extending around the needle 16 and attachable to hub 18 to protect health care personnel from contact the sharp distal point 21a of the needle. Flutes 21 may also engage internal grooves extending longitudinally within the sheath to permit the rotation of the needle assembly without removing the sheath. Plunger assembly 12 includes an elongated slide 22 having gripping means 24 at its proximal end, an inward extending needle extractor 26, and an elastomeric piston 28 which extends over a disk shaped distal end portion 30 of slide 22, and around a flange 31 of extractor 26.

[0034] Figure 2 shows syringe 10 as ready to dispense medication 34 through needle 16. This medication 34 may have been drawn through needle 16 from a vial, not shown, as plunger assembly 12 was moved to the position shown near the proximal end 36 of barrel 14. Alternatively, the medication 34 may have been supplied to a health care facility as part of the syringe package. Elastomeric piston 28 forms a seal around the internal cylindrical surface 37 of barrel 14, so that pressure may be built up within the cylinder interior of barrel 14 by sliding plunger assembly 12 toward distal end 38, as required to dispense the medication 34 through needle 16, without substantial leakage of the medication 34 past piston 28.

[0035] A more detailed view of the relationships among slide 22, elastomeric piston 28, and needle extractor 26 is also provided in the cross-sectional view of Figure 4. Elastomeric piston 28 is essentially a hollow cylindrical structure having a large hole in one end, through which distal end portion 30 of slide 12 is inserted, and a smaller hole in the opposite end, through which flange 31 of needle extractor 26 is inserted. The elastic properties of piston 28 produce a clamping action to hold flange 31 against end portion 30. Alternatively, needle extractor 26 may be secured to end portion 30 by a suitable adhesive or may be molded as a part of the slide 22 and end portion 30 assembly. Since the proximal end surface 40 of flange 31 is slanted relative to the axis of hub portion 42 of extractor 26, hub portion 42 is slanted, at an acute angle to the longitudinal axis of barrel 14, when flange 31 and end portion 30 are held together in this way.

[0036] The manner by which needle 16 is contacted by barrel 14 is shown particularly in Figure 3. A needle collar 42a of metal, or other hard material, including a hub neddle 43 and a needle flange 44, is fastened to a proximal end of needle 16, preferably by a swaging procedure or an adhesive, to form a needle subassembly. Needle assembly 17 is formed when needle 16 is subsequently inserted through a needle receiving hole 45a in Luer hub 18, being pushed through this hole 45a until needle 16 extends through hub 18, with a distal side of flange 44 in contact with an adjacent surface 45 of the hub that is below the proximal end of hub 18. A luer coupling flange 46 extends from the proximal end of hub 18.

[0037] The distal end of barrel includes a skirt which has internal luer threads 48 adapted to receive luer flange 46 of hub 18 to secure needle assembly 17 to barrel 14 as shown in Figures 3 and 4. A luer tip 51 extends from the distal end of barrel 14 and defines a channel 50 therethrough from the interior of barrel 14. As shown in Figure 3 the distal tip 61 of luer tip 51 contacts the proximal side of flange 44. In this manner needle 16 is captured between hub 18 and luer tip 51 of barrel 14.

[0038] A sealant is preferably added to the annular space between needle 16 and the internal surface of needle receiving hole 45a. The need for this form of sealing exists because, while it is neither necessary nor desirable to produce a tight fit between needle 16 and hub 18, it is necessary to establish a partial vacuum within syringe 10 as plunger assembly 12 is pulled outward to fill the syringe with medication 34. Further, necessary to establish hydraulic pressure within syringe 10 as plunger 12 is subsequently pushed inward to inject the medication 34 into a patient. Thus, there is a need to prevent the inward leakage of air, or the outward leakage of medication, through the space between needle 16 and hub 18. However, it is necessary that the sealing agent does not permanently bond to the needle.

[0039] Several different types of sealants may be used to seal needle 16 and hole 45a. For example, a heavy grease, such as a petroleum jelly may be used

for the sealant, as can a number of room temperature vulcanizing (RTV) silicone adhesives, or yieldable medical adhesives, such as the product available as Dymax Light Weld #190-M.

[0040] Luer hub 18 includes, at its proximal end, a conventional thread engaging flange 46, shaped as a disk with truncated sides, which engages an internal thread 48 within threaded opening 20 of barrel 14. In this way, needle assembly 17 is removably fastened to barrel 14. A number of different needle assemblies can he provided for interchangeable attachment in this manner, with such needle assemblies varying, for example, in the length and diameter of the needle.

[0041] Thus, while the needle retraction feature is provided by means which will be explained, the attachment of the needle to the syringe barrel is achieved by conventional means, through the use of a Luer connection allowing attachment from outside the distal and of the syringe barrel. In fact, conventional needle assemblies, without provision for needle retraction, can be attached through this conventional connection to syringe barrel 14 built in accordance with the present invention, and needle assemblies 17 built in accordance with this invention can be attached to conventional syringe barrels. If parts made in accordance with this invention are assembled with conventional parts in either of these ways, the needle retraction feature will not be operative, but the syringes can still be used and disposed in conventional ways. This is a particular advantage to a health care facility, with an inventory of conventional needles and syringes, in the process of converting to the use of syringes having the needle retraction feature.

[0042] This needle attachment arrangement of the subject invention offers particular advantages, of ease of use and interchangeability with conventional parts, over the arrangements shown, for example, in U.S. Patent 4/826,484 to Haber et al, in which a needle must be pressed into a tight fitting hole from inside the barrel cavity. This needle attachment arrangement of the subject invention offers advantages over the arrangements of, for example, U.S. Patents 4,675,005 to DeLuccia, 4,747,830 to Gloyer et al, 4,919,652 to Alter et al, and 4,986,813 to Blake III et al, which require that the needle assembly must be screwed into a threaded hole, or into a quick release fastener, within the distal end of the barrel, from inside the barrel cavity.

[0043] During the process of handling syringe 10 before an injection is given and during the process of dispensing medication 34 by means of injection, flange 44 of needle 16 is contacted and hold by the distal end 61 of luer tip 51. Flange 44 cannot pass through the smaller diameter distal opening of channel 50 provided at the distal end 61 of luer tip 51 of barrel 14. Thus, flange 44 provides an annular shoulder on each side, serving in the transmission of any thrust forces in either direction, which may occur at the needle during the injection process.

[0044] Referring again to Figure 2, an injection is given to the patient in the conventional way, by moving plunger assembly 12 through the cylindrical interior of barrel 14. As plunger assembly 12 nears the distal end of barrel 14, distal tip 52 of extractor hub 42 portion of needle extractor 26 contacts funnel shaped internal surface 54 of barrel 14. As noted above, needle extractor 26 is maintained out of alignment with the axis of channel 50 by means of the engagement between slider end portion 30 and extractor flange 31. However, the angle of funnel shaped surface 54 is aufficient to ensure that tip 52 is guided into alignment with channel 50 with continued motion of plunger assembly 12 into barrel 14, when tip 52 in contact with surface 54.

[0045] Referring again to Figure 3, the distal end 61 of luer tip 51 is slanted slightly inward and has a series of inward extending slots 56 at a narrowed portion 60 of channel 50, separating the distal end of luer tip 51 into plural segments 58. When extractor tip 52 is brought into engagement with needle hub 43, slots 56 are sized to receive hub 42 of extractor 26 and permit the expansion of the distal end of luer tip 51 by the flexure of the segments 58 formed between slots 56. The expansion of segments 58 only occurs as extractor tip 52 is brought into the narrowed portion 60 of channel 50 at the distal end of channel 50.

[0046] Thus, thrust forces required for the insertion of a portion of needle 16 into the patient are provided through the abutment of needle flange 44 and the ends 61 of segments 58 prior to the separation of segments 58. This structure provides a particular advantage over the prior art, for example, in U.S. Patent 4,826,484 to Haber et al, which requires that the thrust forces to be provided through a tight fit between the needle and a distal hole in the barrel, which fit is much more prone to failure than the abutting structure of ends 61 against flange 44. With the structure of the present invention, sufficient force to deflect segments 58 outward is applied at the very end of the inward movement of plunger assembly 12, long after the needle is fully inserted in the patient and at the time the medicine is dispensed.

[0047] Further, the disengagement of the abutting structure of ends 61 against flange 44 is accomplished by deflecting segments 58 arranged to extend as cantilever springs. This structure has the significant advantage of requiring very low deflection forces compared to the those required by the structure of the prior art. For example, in U.S. Patent 4,790,822 to Haining, the abutting surfaces are provided as parts of shoulders extending inward from the wall of the syringe barrel, so that this wall must be deflected outward around all sides of the shoulders before the needle can be retracted with a needle carrier.

[0048] As shown in Figure 4, when the motion of plunger assembly 12 toward the distal end of barrel 14 has been completed, distal tip 52 of needle extractor 26 has moved through channel 50 to engage and grasp needle hub 43 for the retraction of needle 16. At this position, a wedge shaped gap 63 exists between prox-

imal surface 40 of flange 31 and distal end 36 of slide 22 resulting from needle extractor 26 being guided into channel 50. Tip 52 has a tubular shape, which tightly grasps and holds needle hub 43 in extractor hub 42. The expansion of coupling tip 58 with the insertion of extractor tip 52 enlarges the narrowed opening 60 of channel 50 to clear the diameter of flange 44, so that needle 16 may be retracted into barrel 14 with the subsequent pulling of plunger assembly 12 towards proximal end 36 of the barrel using gripping means 24 at the proximal end of slide 22.

[0049] As shown in Figures 3 and 4, as needle 16 is about to be retracted from the patient, it is in contact with flange 44 abutting against abutment surface 45 of Luer hub 18. Thus, as slide in cylinder 14 is pulled rearward, needle 16 moves with slide 22.

[0050] With this structure, the needle retraction feature is included in syringe 10 without significantly, if at all, increasing the length of the parts subsequently moved into the interior of barrel 14, as seen in Figure 6. Thus, it is not necessary to increase the length of barrel 14, beyond the normal length of barrel 14, which already is sufficient to hold needle 16 itself. A syringe with the size and length of a conventional syringe can be thus provided with the needle retraction feature using most existing parts. In this regard, a particular advantage is gained relative to the use of a separate needle carrier, slidably mounted to move in a syringe barrel cylinder, as shown, for example in U.S. Patents 4,710,170 to Haber et al, 4,790,822 to Haining, and 4,883,471 to Braginetz et al. Further, the needle holding structure of the present invention makes it unnecessary to seal around the large diameter of a separate needle carrier.

[0051] It is desirable to remove needle 16 from the patient by pulling plunger assembly 12 while pushing cylinder assembly 14 in order to maintain the distal end of cylinder assembly against the skin of the patient as needle 16 is drawn into cylinder 14. Referring to Figure 5, needle retraction using plunger assembly 12 may be accomplished by providing needle hub 43 with one or more ridges 64 to increase the thrust force which can be applied to extract needle 16 without breaking the bond between retraction assembly 26 and needle 16. In Figure 5, neodle 16 is shown extending through an opening 88 in flange 44 and hub 43 permitting fluid communication through the opening 90 in needle 16. Alternatively, flange 44 and hub 43 may be integrally formed as a part of needle 16. Further, the internal surface of extractor hub 42 may also be provided with ridges, or reliance can be made on the ridges 64 of the hub 43 pressing into the relatively soft interior of plastic extractor hub 42.

[0052] The technique of using plunger assembly 12 to withdraw needle 16 has the advantage of providing an additional measure of safety, in that the needle is immediately retracted directly into a safe position. On the other hand, the technique of withdrawing the needle by pulling on cylinder 14 may be easier to perform, since it is fully consistent with conventional syringes and the medical personnel do not have to change the way in which syringe 10 is traditionally used. In the latter traditional case, needle 16 is drawn into barrel 14 after it is fully removed from the patient, as explained above.

[0053] The method of attachment between extractor 26 and needle 16 offers an advantage in simplicity of use over the methods of, for example, U.S. Patents 4,675,005 to DeLuccia, 4,747,830 to Gloyer et al, 4,919,652 to Alter et al, and 4,986,813 to Blake III et al, which require the rotation of the plunger after medication is dispensed, to disengage the needle from the syringe barrel and to engage it to the plunger.

[0054] As shown in Figure 6, after plunger assembly 12 has been completed withdrawn to its initial position as seen in Figure 2, needle 16 is completely enclosed within barrel 14. As the tip 21a of needle 16 clears the proximal end of opening 50, the clamping action of elastomeric piston 28 on flange 31 of extractor 26 tends to bring proximal end surface 40 of flange 31 into contact with distal end flange 30 of slider 22, thereby rotating needle 16 transversely, to point toward a side of barrel 14. If plunger assembly 12 is subsequently pushed inward, into barrel 14, tip 21a of needle 16 will dig into funnel shaped surface 54 of barrel 14, preventing its later exposure or reuse. Needle 16 is thus totally enclosed in a manner permitting its safe handling and disposal.

[0055] A further refinement in preventing the surreptitious disassembly of the syringe by a drug abuser after disposal may be employed, as best understood by examining the differences between Figures 7 and 8. Figure 7 shows a cross-sectional view of the proximal portion 66 of a conventional syringe, with a conventional plunger 68 pulled outward, so that a flange 70 of plunger 68 rests against an inwardly extending ring 72. While this arrangement is adequate to prevent inadvertent removal of plunger 68 from the syringe, it is not difficult for a drug abuser to remove the plunger. In the structure shown in Figure 8, on the other hand, an improved ring 74 may alternately be provided, with a slanted surface 76 facilitating the insertion of plunger 68, as required in the assembly of the syringe, while a relatively flat annular surface 78 prevents removal of the plunger after disposal of the syringe. In this way, it is made particularly difficult for a drug abuser to remove the plunger to gain access to a needle held within cylindrical surface 37. Thus, the surreptitious disassembly and reassembly of the syringe may be prevented.

[0056] An alternative structure for attaching needle 16 to extractor 26 is shown in Figure 9, with like numerals being used to designate parts with like functions. In the Figure 9 structure, a needle subassembly 79 is formed when a collar 42a, including a needle hub 80 and a needle flange 44, is attached to a needle 16, preferably using a swaging process, between a distal needle portion 82 and a relatively short proximal needle portion 84. Needle hub 80 is directed toward distal needle portion 82. Luer hub 18 includes an enlarged cavity 84, into which needle hub 82 extends when distal needle portion

82 is fully inserted through needle receiving hole 45a. An abutting surface 45 of Luer hub 18 transmits thrust forces to a distal side of needle flange 44 when needle 16 is withdrawn from a patient. Proximal needle portion 84 may include a series of ridges 64 to increase the force which can be applied by extractor 26 to extract needle 16. Hole 86 within tip portion 52 mates with proximal needle portion 84.

[0057] As noted above with respect to Figure 6, the needle may be rotated transversely to prevent it being exposed or reused after the initial usage. Referring now to Figures 10 and 11, a syringe 100 having a barrel 102 and a plunger 104 from which a needle 105 is held, is shown which includes a spring clip 106 to also prevent the needle from being exposed or reused after initial usage. Clip 106, which has a spring bias radially outward, is held longitudinally between a plate 108 and the proximal end of the piston head 110 and radially by the interior 112 of barrel 102. In the compressed position, seen in Figure 10, clip 106 is generally in the shape of a compressed U and has a pair of lips 114 biased against the inner surface 112 of barrel 102.

[0058] As seen in Figure 11, after the handle 116 of plunger 104 is fully removed, the lips 114 of clip 106 radially expand to cover the end 118 of barrel 102. In this position, clip 106 prevents the re-depression of handle 116 and the re-exposure of needle 105. An inward extending ring 120 may be included to prevent outward movement of plunger 104, as described with respect to Figure 8. Clip 106, because of the spring construction thereof, is easily compressed to slide around ring 120 during the withdrawal of plunger 104. Thus, plunger is held firmly in the position shown in Figure 11, thereby preventing reuse of syringe 100 or re-exposure of needle 105.

[0059] Referring now to Figure 12, another version of a syringe 122 the subject invention is shown, in which a plunger 124 is a single molded piece of plastic sized to form a seal with the interior surface of a barrel 124. In addition, an extractor 126 is formed at the distal end of plunger 124 to interface with a needle assembly 128 similar to needle assembly 17 shown in Figure 1.

[0060] In using syringe 122, it may be necessary to aspirate a liquid into syringe prior to dispensing that same liquid into the patient. In aspirating the liquid, it is not desirable to grip the needle assembly 128 and withdraw it into barrel 124. Thus, when aspirating the fluid, plunger 122 should not be depressed entirely, such that extractor 126 grips the hub 130 of needle assembly 128. In order to forewarn the user, one or more dimples 132 may be formed on extractor 126 at a position such that when extractor 126 enters the luer connector end of barrel 124, dimples present an resistance to further depression at a position just prior to extractor 126 engaging hub 120. The resistance would be a signal to the user of syringe 122 to cease applying force to plunger 124 and begin aspirating the liquid. After dispensing the liquid, the user of syringe 122 may depress plunger 124 with more force after noticing the resistance due to dimples 132 in order to overcome the resistance and cause extractor 126 to engage needle assembly 128, as described above.

[0061] An alternative to dimples 132 would be an inward facing ring 134 positioned on the interior surface of barrel 124. While both dimples 134 and ring 136 are shown in Figure 12, in practice, only one of these elements would be used.

[0062] While the invention has been described in its preferred forma or embodiments with some degree of particularity, it is to be understood that this description has been given only by way of example and that numerous changes in the details of construction, fabrication and use, including the combination and arrangement of parts, may be made without departing from the scope of the claims.

Claims

1. A syringe including a barrel member (14) having proximal and distal ends, said barrel member (14) having a luer tip (51) at its distal end (61) defining a channel (50) therethrough in communication with the interior of said barrel member (14), a plunger (12) slideable in said barrel member (14) to force fluid through said channel (50) or to create a vacuum in said barrel member (14), a needle assembly (17) including a hub member (18) slideably receiving a hollow needle (16) therethrough, said needle (16) having a distal piercing end and a proximal end extending into said hub member (18) said hub member and the distal end of said barrel member (14) having interlocking devices (46,48) for securing said needle assembly (17) to said barrel member (14) at the distal end of said barrel member (14) with said needle (16) aligned with said channel (50), **characterized in that** said needle (16) is slideable in said hub member (18) toward said barrel member (14) and said needle has a collar (42a) thereon near the proximal end thereof in said hub member (18), said collar (42a) comprising an outwardly extending flange (44) engaging a wall (45) of said hub member (18) and a needle hub (43), said luer tip (51) bearing on said flange (44) opposite said wall (45) and being expandable at its distal end (61) to a dimension greater than said flange (44) and an extractor member (26) extending from said plunger (12) adapted to extend through said channel (50), expand the distal end (61) of said luer tip (51) and grasp said needle hub (43) whereby when said plunger (12) is retracted toward the proximal end of said barrel member (14) said needle (16) is retracted into said barrel member (14).

2. The syringe of claim 1, further **characterized in that** the expandable distal end (61) of said luer tip

(51) is segmented.

3. The syringe of claim 1, further **characterized in that** said extractor member (26) has a distal tip (52) smaller in diameter than said channel (50) and larger in diameter than said flange (44) and an extactor hub portion (42) at the distal end of said extractor member (26) to grasp the needle hub (43).

4. The syringe of claim 3, further **characterized in that** said extractor hub portion (42) is disposed on said extractor member (26) such that when said needle assembly (17) is grasped by said extractor member (26), said needle flange (44) is sufficiently proximate to said extractor tip (52) that said expandable distal end (61) of said luer tip (51) will not engage said flange (44) as said needle assembly (17) is withdrawn through said channel (50).

5. The syringe of claim 4, further **characterized in that** the expandable distal end portion (61) of said luer tip (51) is segmented.

6. A syringe of claim1 further **characterized in that** said flange (44) is captured between said wall (45) of said hub member (18) and said luer tip (51) to immobilize said needle (16) against axial movement with respect to said hub member (18) when said barrel is advanced to inject said needle (16) and said extractor member (26) is arranged to enter said channel (50), radially distend said distal end (61) of said luer tip (51) and grasp said needle hub (43) after injection of fluid into an patient whereby upon retraction of said plunger (12) said extractor member (26) retracts said needle (16) into said barrel member (14).

7. The syringe of claim 6 further **characterized by** said expandable distal end (61) of said luer tip (51) having a constricted position wherein the diameter of the channel (50) is smaller than the diameter of said flange (44) and an expanded position wherein the diameter of the channel (50) is larger than the diameter of said flange (44), said extractor member (26) including, at a distal end thereof, an extractor hub portion (42) to expand said expandable distal end (61) and grasp said needle hub (43).

8. A syringe having a barrel (14) with a hollow interior (37) and a male luer tip (51) at a distal end of said barrel (14), said luer tip (51) including a channel (50) extending therethrough **characterized by** a distal end (61) of said luer tip (51) being expandable from a constricted small diameter to an expanded position wherein the channel (50) opening at said distal end (61) is larger than said constricted small diameter and a member (26) in said syringe barrel (14) movable through said channel (50) into said distal end (61) to expand said constricted distal end (61).

9. The syringe of claim 8, further **characterized in that** the expandable distal end (61) of said luer tip (51) is segmented.

10. The syringe of claim 8 or 9 **characterized in that** said member (26) is an extractor (26) moveable within said barrel (14), a distal tip (52) of said extractor (26) having a hub portion (42) smaller in diameter than said channel (50) in the expanded position of said distal end (61) of said luer tip (51) and larger in diameter than the distal end (61) of said channel (50) in the unexpanded position of said distal end (61) of said luer tip (51).

11. A hypodermic syringe including a needle assembly (17), said needle assembly including a hub member (18) defining a channel (50) therethrough for a needle (16), said hub member (18) having a barrel coupling (46) at a proximal end thereof and a wall (45) spaced from said barrel coupling (46), a barrel (14) having a generally cylindrical cavity (37), a needle attachment coupling (48) at a distal end thereof for attaching said hub member (18) to said barrel (14), a luer tip (51) at a distal end (61) of said barrel (14) and a plunger (12) mounted to slide within said cavity (37), including a slide (22) and a piston (28) forming a sealing engagement with said cavity (37), **characterized by** an enlarged member (42a) on said needle (16) comprising a needle flange (44) and a needle hub (43) of lesser diameter than said flange (44), one side of said flange (44) contacting said wall (45) and preventing movement of said needle (16) toward a distal end of said hub member (18), the distal end (61) of said luer tip (51) contacting the other side of said flange, said distal end (61) of said luer tip (51) being expandable to a dimension which permits passage of said flange (44) through said channel (50) in said luer tip (51), an extractor member (26) extending from said slide (22), said extractor member (26) being arranged to pass through said channel (50), expand said distal end (61) and grasp said needle hub (43) and retract said needle (16) into said barrel (14) when said slide (22) is retracted.

12. The hypodermic syringe of claim 11 **characterized in that** said expandable distal end (61) of said luer tip (51) comprises a plurality of segments (58) arranged around the distal opening of said channel (50) through said luer tip (51) forming a restriction of said channel (50) to prevent passage therethrough of said needle flange (44) when said segments (58) are not expanded.

13. The hypodermic syringe of claim 12 **characterized in that** said luer tip (51) and said segments (58) are

formed integrally with said barrel (14); **in that** said segments (58) are separated by slots (56) extending inward from distal surfaces of said segments (58), in a longitudinal direction along said luer tip (51) and **in that** said segments (58) are formed to block passage of said needle flange (44) in an non-expanded state.

14. The hypodermic syringe of any one of claims 12 or 13 **characterized in that** said plunger (12) includes elastic means for holding a distal extractor tip (52) disposed at an acute angle relative to a central axis of said cavity (37), **in that** said cavity (37) is of sufficient length to receive and enclose said needle (16) when said proximal end of said needle (16) is held by an extractor hob portion (42); and **in that** said cavity (37) includes, at a distal end, a funnel shaped surface (54) extending inward to said channel (50).

15. The hypodermic syringe of claim 14 **characterized in that** said extractor member (26) includes a proximal extractor surface (40) opposite said distal extractor tip (52), said proximal extractor surface (40) being inclined relative to an axis of said distal tip (52); **in that** said plunger (12) includes a plunger surface extending perpendicularly to said central axis of said cavity (37); and **in that** said elastic means holds said proximal extractor surface (40) against said plunger surface.

16. The hypodermic syringe of claim 15 **characterized in that** said extractor member (26) further includes an extractor hub (42) and an extractor flange (31), said extractor hub (42) extending between said distal extractor tip (52) and said extractor flange (31), said proximal extractor surface (40) being formed as part of said extractor flange (31); and **in that** said piston (28) includes an elastic distal piston portion extending around said extractor flange (31), with said extractor hub (42) extending through an aperture in said distal piston portion, with said distal piston portion holding said proximal extractor surface (40) against said plunger surface.

17. The hypodermic syringe of any one of Claims 11,12 or 13 **characterized in that** said needle flange (44) is formed as part of a collar (42a) secured in place on said needle (16); and **in that** a needle hub (43) extending from a proximal side of said needle flange (44) is additionally part of said collar (42a), said needle hub (43) and said needle flange (44) being on said proximal portion of said needle assembly (17).

18. The hypodermic syringe of any one of claims 11,12 or 13 **characterized in that** said needle flange (44) is formed as part of a collar (42a) secured in place on said needle (16), with a distal portion of said needle (16) extending from a distal side of said collar (42a), and with a proximal portion of said needle (16) extending from a proximal side of said collar (42a), said proximal portion of said needle (16) forming a proximal portion of said needle assembly (17); and **in that** a hub (43) extending from a distal side of said needle flange (44) is additionally part of said collar (42a).

19. The hypodermic syringe of claim 18 further **characterized in that** said proximal portion of said needle assembly (17) includes a ridge (64) formed to resist slippage when a tensile force is applied to said proximal portion of said needle (16).

20. The hypodermic syringe of one of claims 11,12 or 13 **characterized in that** a sealant is applied within an annular space between said needle (16) and said needle hub (18).

21. The hypodermic syringe of claim 11 **characterized in that** an attachment portion (20) of said needle attachment coupling (48) and a mating portion (46) of said hub member (18) are engageable by relative rotation in a first direction and disengageable by relative rotation in a direction opposite said first direction; and **in that** said needle (16) and said member hub (18) are together attachable and removable from a distal end of said needle attachment coupling (48), from outside said barrel (14).

22. The hypodermic syringe of claim 11 further **characterized by** plunger travel limiting means (74,78) for stopping outward motion of said plunger (12) beyond a proximal end of said barrel (14).

23. The syringe of claim 1, further **characterized by** expanding means (106) radially held within said barrel member (102) while said needle (105) is positioned within said barrel member (102), said expanding means (106) being expanded over a proximal end (118) of said barrel member (102) upon withdrawal after a certain distance of said needle (105) from said barrel member (102), thereby inhibiting repositioning of said needle (105) within said barrel member (102).

24. The syringe of claim 23 **characterized by** means (120) to limit the withdrawal of said needle (105) from said barrel member (102) to said certain distance.

25. The syringe of claim 1 further **characterized in that** the extractor (26, 126) is moveable within said barrel member (122) to be connected with said needle assembly (128) and to withdraw said needle assembly (17, 128) into said barrel member (122), and by means (132, 134) to indicate the approaching con-

nection between said extractor member, (126) and needle assembly (128) as said extractor member (126) moves towards said needle assembly (128).

Patentansprüche

1. Spritze mit einem ein nahes und ein fernes Ende aufweisenden Zylinderelement (14), wobei das Zylinderelement (14) an seinem fernen Ende (61) eine Luer-Spitze (51) aufweist, die einen durch diese verlaufenden, mit dem Inneren des Zylinderelementes (14) in Verbindung stehenden Kanal (50) bestimmt, einem in dem Zylinderelement (14) verschiebbaren Kolben (12) zum Zwingen eines Fluids durch den Kanal (50) oder zum Erzeugen eines Vakuums in dem Zylinderelement (14), einer Nadelanordnung (17), die ein Kappenelement (18) aufweist, welches eine durch dieses geführte Hohlnadel (16) gleitend aufnimmt, wobei die Nadel (16) ein fernes Einstichende und ein nahes, sich in das Kappenelement (18) erstreckendes Ende aufweist, wobei das Kappenelement und das ferne Ende des Zylinderelementes (14) Verriegelungsvorrichtungen (46, 48) zum Sichern der Nadelanordnung (17) an dem Zylinderelement (14) am fernen Ende des Zylinderelementes (14) aufweist, wobei die Nadel (16) mit dem Kanal (50) ausgerichtet ist,
dadurch gekennzeichnet,
daß die Nadel (16) in dem Kappenelement (18) in Richtung des Zylinderelementes (14) verschiebbar ist und daß die Nadel nahe ihrem nahen Ende in dem Kappenelement (18) einen an der Nadel ausgebildeten Kragen (42a) aufweist, wobei der Kragen (42a) eine nach sich außen erstreckenden Flansch (44) aufweist, der an einer Wand (45) des Kappenelementes (18) und an einer Nadelkappe (43) angreift, daß die Luer-Spitze (51) sich auf dem Flansch (44) gegenüber der Wand (45) abstützt und an ihrem fernen Ende (61) zu einer Abmessung erweiterbar ist, die größer ist als der Flansch (44), und daß sich ein Ausziehelement (26) von dem Kolben (12) erstreckt welches dazu angepaßt ist, sich durch den Kanal (50) zu erstrecken, das ferne Ende (61) der Luer-Spitze (51) zu dehen und die Nadelkappe (43) zu ergreifen, wobei die Nadel (16) in das Zylinderelement (14) zurückgezogen wird, wenn der Kolben (12) in Richtung des nahen Endes des Zylinderelementes (14) zurückgezogen wird.

2. Spritze nach Anspruch 1, **dadurch gekennzeichnet, daß** das erweiterbare ferne Ende (61) der Luer-Spitze (51) segmentiert ist.

3. Spritze nach Anspruch 1, **dadurch gekennzeichnet, daß** das Ausziehelement (26) eine ferne Spitze (52) aufweist, die einen Durchmesser aufweist, der kleiner ist als der des Kanals (50) und größer als der des Flansches (44), sowie einen Auszieherkappenabschnitt (42) am fernen Ende des Ausziehelements (26), um die Nadelkappe (43) zu erfassen.

4. Spritze nach Anspruch 3, **dadurch gekennzeichnet, daß** der Auszieherkappenabschnitt (42) an dem Ausziehelement (26) so angeordnet ist, daß, wenn die Nadelanordnung (17) von dem Ausziehelement (26) erfaßt wird, der Nadelflansch (44) ausreichend nah an der Ausziehspitze (52) liegt, daß das erweiterbare ferne Ende (61) der Luer-Spitze (51) an dem Flansch (44) nicht angreift, wenn die Nadelanordnung (17) durch den Kanal (50) zurückgezogen wird.

5. Spritze nach Anspruch 4, **dadurch gekennzeichnet, daß** der erweiterbare Abschnitt (61) des fernen Endes der Luer-Spitze (51) segmentiert ist.

6. Spritze nach Anspruch 1, **dadurch gekennzeichnet, daß** der Flansch (44) zwischen der Wand (45) des Kappenelementes (18) und der Luer-Spitze (51) gefangen ist, um die Nadel (16) gegen eine bezüglich des Kappenelements (18) axiale Bewegung festzulegen, wenn der Zylinder vorbewegt wird, um die Nadel (16) zu injizieren, und daß das Ausziehelement (26) so angeordnet ist, daß es nach der Injektion von Fluid in einen Patienten in den Kanal eintritt, radial aufgebogen in das ferne Ende (61) der Luer-Spritze (51) eintritt und die Nadelkappe (43) ergreift, wobei nach einem Zurückziehen des Kolbens (12) das Ausziehelement (26) die Nadel (16) in das Zylinderelement (14) zurückzieht.

7. Spritze nach Anspruch 6, **dadurch gekennzeichnet, daß** das verlängerbare ferne Ende (61) der Luer-Spitze (51) eine eingeschnürte Position aufweist, in der der Durchmesser des Kanals (50) kleiner ist als der Durchmesser des Flansches (44), sowie eine erweiterte Position, in der der Durchmesser des Kanals (50) größer ist als der Durchmesser des Flansches (44), wobei das Ausziehelement (26) an einem fernen Ende einen Auszieherkappenabschnitt (42) zum Erweitern des erweiterbaren fernen Endes (61) und zum Ergreifen der Nadelkappe (43) aufweist.

8. Spritze mit einem Zylinder (14) mit einem hohlen Inneren (37) und einer Außen-Luer-Spitze (male luer tip) (51) an einem fernen Ende des Zylinders (14), wobei die Luer-Spitze (51) einen Kanal (50) aufweist, der sich durch diese erstreckt,
dadurch gekennzeichnet,
daß ein fernes Ende (61) der Luer-Spitze (51) aus einem eingeschnürten kleinen Durchmesser in eine erweiterte Position erweiterbar ist, wobei die Öffnung des Kanals (50) an dem fernen Ende (61) grö-

ßer ist als der eingeschnürte, kleine Durchmesser, und daß es ein Element (26) aufweist, welches in dem Zylinder (14) der Spritze durch den Kanal (50) in das ferne Ende (61) bewegbar ist, um das eingeschnürte ferne Ende (61) zu erweitern.

9. Spritze nach Anspruch 8, **dadurch gekennzeichnet, daß** das erweiterbare ferne Ende (61) der Luer-Spitze (51) segmentiert ist.

10. Spritze nach einem der Ansprüche 8 oder 9, **dadurch gekennzeichnet, daß** das Element (26) ein in dem Zylinder (14) beweglicher Auszieher (26) ist, daß eine ferne Spitze (52) des Ausziehers (26) einen Kappenabschnitt (42) aufweist, der in der erweiterten Position des fernen Endes (61) der Luer-Spitze (51) einen kleineren Durchmesser aufweist als der Kanal (50) und in der nicht erweiterten Position des fernen Endes (61) der Luer-Spitze (51) einen größeren Durchmesser aufweist als das ferne Ende (61) des Kanals (50).

11. Subkutane Injektionsspritze mit einer Nadelanordnung (17), wobei die Nadelanordnung ein Kappenelement (18) aufweist, welches einen durch dieses verlaufenden Kanal (50) für eine Nadel (16) definiert, wobei das Kappenelement (18) an einem nahen Ende einen Anschluß (46) für einen Zylinder und eine von dem Anschluß (46) für den Zylinder beabstandete Wand (45) aufweist, einen Zylinder (14) mit einem allgemein zylindrischen Hohlraum (37), einem einen allgemein zylindrischen Hohlraum (37) aufweisenden Zylinder (14), einem Nadelbefestigungsanschluß (48) an einem fernen Ende zum Anschließen des Kappenelements (18) an dem Zylinder (14), einer Luer-Spitze (51) an einem fernen Ende (61) des Zylinders (14) und einen zum Verschieben innerhalb des Hohlraumes (37) angeordneten Kolben (12) mit einem Schieber (22) und einem Kolbenelement (28), die dichtend an dem Hohlraum (37) angreifen,
dadurch gekennzeichnet,
daß sie ein vergrößertes Element (42a) an der Nadel (16) aufweist, welches einen Nadelflansch (44) und eine Nadelkappe (43) von kleinerem Durchmesser als der Flansch (44) aufweist, wobei eine Seite des Flansches (44) die Wand (45) berührt und eine Bewegung der Nadel (16) in Richtung eines fernen Endes des Kappenelementes (18) verhindert, wobei das ferne Ende (61) der Luer-Spitze (51) die andere Seite des Flansches berührt, wobei das ferne Ende (61) der Luer-Spitze (51) zu einer Dimension erweiterbar ist, welche ein Durchtreten des Flansches (44) durch den Kanal (50) in der Luer-Spitze (51) ermöglicht, wobei sich ein Auszieherelement (26) von dem Schieber (22) erstreckt, wobei das Auszieherelement (26) so angeordnet ist, daß es durch den Kanal (50) durchtritt, das ferne Ende (61) erweitert und die Nadelkappe (43) erfaßt und die Nadel (16) in den Zylinder (14) zurückzieht, wenn der Schieber (22) zurückgezogen wird.

12. Subkutane Injektionsspritze nach Anspruch 11, **dadurch gekennzeichnet, daß** das erweiterbare ferne Ende (61) der Luer-Spitze (51) eine Vielzahl von Segmenten (58) aufweist, die durch die Luer-Spitze (51) um die ferne Öffnung des Kanals (50) herum angeordnet sind und einen Verschluß des Kanals (50) bilden, um einen Durchgang des Nadelflansches (44) durch diesen zu verhindern, wenn die Segmente (58) nicht erweitert sind.

13. Subkutane Injektionsspritze nach Anspruch 12, **dadurch gekennzeichnet, daß** die Luer-Spitze (51) und die Segmente (58) einstückig mit dem Zylinder (14) ausgebildet sind, daß die Segmente (58) durch Schlitze (56) getrennt sind, die sich von fernen Oberflächen der Segmente (58) in einer Längsrichtung entlang der Luer-Spitze (51) nach innen erstrecken, und daß die Segmente (58) so gebildet sind, daß sie in einem nicht erweiterten Zustand den Durchtritt des Nadelflansches (44) blockieren.

14. Subkutane Injektionsspritze nach einem der Ansprüche 12 oder 13, **dadurch gekennzeichnet, daß** der Kolben (12) ein elastisches Element aufweist zum Halten einer fernen Auszieherspitze (52), welche in einem bezüglich einer Mittelachse des Hohlraumes (37) gebogenen Winkel angeordnet ist, daß der Hohlraum (37) eine ausreichende Länge aufweist, die Nadel (16) aufzunehmen und zu umschließen, wenn das nahe Ende der Nadel (16) von einem Auszieherkappenabschnitt (42) gehalten wird, und daß der Hohlraum (37) an einem fernen Ende eine trichterförmige Oberfläche (54) aufweist, die sich nach innen zu dem Kanal (50) hin erstreckt.

15. Subkutane Injektionsspritze nach Anspruch 14, **dadurch gekennzeichnet, daß** das Auszieherelement (26) gegenüber der fernen Auszieherspitze (52) eine nahe Auszieherfläche (40) aufweist, wobei die nahe Auszieherfläche (40) relativ zu einer Achse der fernen Spitze (52) geneigt ist, daß der Kolben (12) eine Kolbenfläche aufweist, die sich senkrecht zu der Mittelachse des Hohlraumes (37) erstreckt, und daß das elastische Element die nahe Auszieherfläche (40) gegen die Kolbenfläche hält.

16. Subkutane Injektionsspritze nach Anspruch 15, **dadurch gekennzeichnet, daß** das Auszieherelement (26) eine Auszieherkappe (42) und einen Auszieherflansch (31) aufweist, wobei sich die Auszieherkappe (42) zwischen der fernen Auszieherspitze (52) und dem Auszieherflansch (31) erstreckt, wobei die nahe Auszieheroberfläche (40) als ein Teil

des Auszieherflansches (31) gebildet ist, und daß das Kolbenelement (28) einen elastischen fernen Kolbenelementabschnitt aufweist, der sich um den Auszieherflansch (31) herum erstreckt, wobei sich die Auszieherkappe (42) durch eine Öffnung in dem fernen Kolbenelementabschnitt erstreckt, wobei der ferne Kolbenelementabschnitt die nahe Auszieherfläche (40) gegen die Kolbenfläche hält.

17. Subkutane Injektionsspritze nach einem der Ansprüche 11, 12 oder 13 **dadurch gekennzeichnet, daß** der Nadelflansch (44) als Teil eines an der Nadel (16) in Position gesicherten Kragens (42a) gebildet ist und daß eine sich von einer nahen Seite des Nadelflansches (44) erstreckende Nadelkappe (43) ein zusätzliches Teil des Kragens (42a) ist, wobei die Nadelkappe (43) und der Nadelflansch (44) sich an dem nahen Abschnitt der Nadelanordnung (17) befinden.

18. Subkutane Injektionsspritze nach einem der Ansprüche 11, 12 oder 13, **dadurch gekennzeichnet, daß** der Nadelflansch (44) als Teil eines an der Nadel (16) in Position gesicherten Kragens (42a) gebildet ist, wobei ein ferner Abschnitt der Nadel (16) sich von einer fernen Seite des Kragens (42a) erstreckt und wobei ein naher Abschnitt der Nadel (16) sich von einer nahen Seite des Kragens (42a) erstreckt, wobei der nahe Abschnitt der Nadel (16) einen nahen Abschnitt der Nadelanordnung (17) bildet, und daß eine sich von einer fernen Seite des Nadelflansches (44) erstreckende Kappe (43) ein zusätzliches Teil des Kragens (42a) ist.

19. Subkutane Injektionsspritze nach Anspruch 18, **dadurch gekennzeichnet, daß** der nahe Abschnitt der Nadelanordnung (17) einen Rücken (64) aufweist, der gebildet ist, um einem Schlupf zu widerstehen, wenn eine Zugkraft auf den nahen Abschnitt der Nadel (16) ausgeübt wird.

20. Subkutane Injektionsspritze nach einem der Ansprüche 11, 12 oder 13, **dadurch gekennzeichnet, daß** ein Dichtmittel innerhalb eines ringförmigen Zwischenraumes zwischen der Nadel (16) und der Nadelkappe (18) angeordnet ist.

21. Subkutane Injektionsspritze nach Anspruch 11, **dadurch gekennzeichnet, daß** ein Befestigungsabschnitt (20) des Nadelbefestigungsanschlusses (48) und ein dazu passender Abschnitt (46) des Kappenelementes (18) durch eine Relativverdrehung in einer ersten Richtung verbindbar und durch eine Relativverdrehung in einer der ersten Richtung entgegengesetzten Richtung lösbar sind und daß die Nadel (16) und das Kappenelement (18) zusammen an einem fernen Ende des Nadelbefestigungsanschlusses (48) von außerhalb des Zylinders (14) befestigbar und von diesem wieder entfernbar sind.

22. Subkutane Injektionsspritze nach Anspruch 11, **gekennzeichnet durch** Begrenzungsmittel (74, 78) für eine Begrenzung der Kolbenbewegung zum Anhalten einer Auswärtsbewegung des Kolbens (12) über ein nahes Ende des Zylinders (14) hinaus.

23. Spritze nach Anspruch 1, **gekennzeichnet durch** ein Erweiterungselement (106), welches radial in dem Zylinderelement (102) gehalten ist, während die Nadel (105) innerhalb des Zylinderelements (102) positioniert ist, wobei bei einem Zurückziehen der Nadel (105) aus dem Zylinderelement (102) über einer bestimmten Entfernung das Erweiterungselement (106) über ein nahes Ende (118) des Zylinderelementes (102) geweitet ist, wodurch ein erneutes Positionieren der Nadel (105) in dem Zylinderelement (102) verhindert wird.

24. Spritze nach Anspruch 23, **gekennzeichnet durch** Mittel (120) zum Begrenzen des Zurückziehens der Nadel (105) aus dem Zylinderelement (102) bis zu einer bestimmten Entfernung.

25. Spritze nach Anspruch 1, **dadurch gekennzeichnet, daß** der Auszieher (26, 126) in dem Zylinderelement (122) bewegbar ist, um mit der Nadelanordnung (128) verbunden zu werden und um die Nadelanordnung (17, 128) in das Zylinderelement (122) hinein zurückzuziehen, und durch Mittel (132, 134) zum Anzeigen der sich nähernden Verbindung zwischen dem Auszieherelement (126) und der Nadelanordnung (128), wenn das Auszieherelement (126) sich in Richtung der Nadelanordnung (128) bewegt.

Revendications

1. Seringue constituée d'un corps (14) comportant des extrémités postérieure et antérieure, le corps (14) comportant un embout de type luer (51) à son extrémité antérieure (61), définissant un canal (50) qui est en communication avec l'intérieur du corps (14), un piston (12) monté coulissant dans le corps (14) pour propulser un fluide à travers le canal (50) ou pour créer un vide dans le corps (14), un ensemble à aiguille (17) comprenant un manchon (18) recevant, à coulissement, une aiguille creuse (16), cette dernière comportant une extrémité antérieure percée et une extrémité postérieure qui s'étend dans le manchon (18), ce dernier, et l'extrémité antérieure du corps (14) comportant des moyens de verrouillage (46,48) pour fixer l'ensemble à aiguille (17) au corps (14) à l'extrémité antérieure de celui-ci, ladite aiguille (16) étant alignée avec le canal (50), **caractérisée en ce que** l'aiguille (16) est montée

coulissante dans le manchon (18) vers le corps (14), et cette aiguille comportant un collier (42a) à proximité de l'extrémité postérieure dans le manchon (18), ledit collier (42a) comportant une bague (44) s'étendant vers l'extérieur en contact avec une paroi (45) du manchon (18) et un fourreau d'aiguille (43), ledit embout de type hier (51) étant en appui sur la bague (44) opposée à la paroi (45) et étant expansible à son extrémité antérieure (61) vers une dimension plus grande que la bague (44), et un élément extracteur (26) qui s'étend à partir du piston (12) et en mesure de s'étendre à travers le canal (50), élargir l'extrémité antérieure (61) de l'embout de type luer (51) et saisir le fourreau d'aiguille (43), de façon telle que lorsque le piston (12) est rétracté vers l'extrémité postérieure du corps (14), l'aiguille (16) est rétractée dans celui-ci.

2. Seringue suivant la revendication 1 **caractérisée en ce que** l'extrémité antérieure expansible (61) de l'embout de type luer (51) est réalisée sous la forme de segments.

3. Seringue suivant la revendication 1 **caractérisée en ce que** l'élément extracteur (26) possède une extrémité antérieure (52) dont le diamètre est plus petit que celui du canal (50) et plus grand que celui de la bague (44), et une partie de manchon d'extracteur (42) à l'extrémité antérieure de l'extracteur (26) pour saisir le fourreau d'aiguille (43).

4. Seringue suivant la revendication 3 **caractérisée en ce que** la partie de manchon extracteur (42) est disposée sur l'élément extracteur (26) de façon que l'ensemble à aiguille (17) soit saisi par l'élément extracteur (26), et la bague (44) soit suffisamment proche de l'extrémité (52) de l'extracteur et que l'extrémité antérieure expansible (61) dudit embout de type luer (51) ne vienne pas en contact avec la bague (44) lorsque l'ensemble à aiguille (17) est retiré à travers le canal (50).

5. Seringue suivant la revendication 4 **caractérisée en ce que** la partie d'extrémité antérieure expansible (61) de l'embout de type luer (51) est réalisée sous forme de segments.

6. Seringue suivant la revendication 1 **caractérisée en ce que** la bague (44) est disposée entre ladite paroi (45) du manchon (18) et l'embout de type hier (51) pour immobiliser l'aiguille (16) contre tout mouvement axial par rapport au manchon (18) lorsque le corps est avancé pour utiliser l'aiguille (16), et l'élément extracteur (26) est disposé de façon à pénétrer dans le canal (50), dégager l'extrémité antérieure de l'embout de type luer (51) et saisir le fourreau d'aiguille (43) après l'injection du fluide dans le corps d'un patient, de façon qu'à la rétraction du piston (12) l'élément extracteur (26) retire l'aiguille (16) du corps (14).

7. Seringue suivant la revendication 6 **caractérisée en ce que** l'extrémité antérieure expansible (61) de l'embout de type luer (51) comporte une position contractée dans laquelle le diamètre du canal (50) est plus petit que le diamètre de la bague (44) et une position expansée dans laquelle le diamètre du canal (50) est plus grand que le diamètre de la bague (44), l'élément extracteur (26) comprenant, à une extrémité antérieure, une partie de manchon extracteur (42) de façon à élargir l'extrémité antérieure expansible (61) et saisir le fourreau d'aiguille (43).

8. Seringue comportant un corps (14) et un intérieur creux (37), un embout mâle de type luer (51) à une extrémité antérieure du corps (14) ledit embout de type luer (51) comprenant un canal (50) qui s'étend à travers celui-ci, **caractérisée en ce que** l'extrémité antérieure (61) de l'embout de type luer (51) est expansible à partir d'un petit diamètre contracté vers une position expansée dans laquelle le canal (50) s'ouvrant à l'extrémité antérieure (61) est plus large que le petit diamètre contracté, et un élément (26) prévu dans le corps (14) qui est monté mobile à travers le canal (50) à une extrémité antérieure (61) pour élargir l'extrémité antérieure (61) contractée.

9. Seringue suivant la revendication 8 **caractérisée en ce que** l'extrémité antérieure expansible (61) de l'embout de type luer (51) est réalisée sous forme de segments.

10. Seringue suivant l'une des revendications 8 ou 9 **caractérisée en ce que** l'étément (26) est un extracteur, mobile à l'intérieur du corps (14), une partie antérieure (52) de cet extracteur comportant une partie (42) formant manchon de diamètre plus petit que le canal (50) dans la position expansée de l'extrémité antérieure (61) de l'embout de type luer (51), et de diamètre plus grand que l'extrémité antérieure (61) du canal (50) dans la position non expansée de l'extrémité antérieure (61) de l'embout de type luer (51).

11. Seringue hypodermique comprenant un ensemble à aiguille (17), ce dernier comprenant un manchon (18) formant un canal (50) destiné à une aiguille (16), le manchon (18) comportant un élément d'accouplement (46) à une extrémité postérieure et une paroi (45) espacée de l'élément d'accouplement (46), un corps (14) comportant une cavité cylindrique (37), un élément d'accouplement d'aiguille (48) à une extrémité antérieure pour fixer le manchon (18) au corps (14), un embout de type luer (51) à

une extrémité (61) antérieure du corps (14) et un piston (12) monté pour coulisser dans la cavité (37) et comprenant un coulisseau (22), et un piston (28) formant un élément d'étanchéité avec la cavité (37), **caractérisée en ce qu**'elle comporte un élément élargi (42a) sur l'aiguille (16) comprenant une bague (44) et un fourreau d'aiguille (43) de plus petit diamètre que la bague (44), un côté de celle-ci venant en contact avec la paroi (45) et empêchant le mouvement de l'aiguille (16) vers une extrémité antérieure du manchon (18), l'extrémité antérieure (61) de l'embout de type luer (51) venant en contact sur l'autre côté de la bague, cette extrémité antérieure (61) de l'embout de type luer (51) étant expansible à une dimension qui permet le passage de la bague (44) à travers le canal (50) dans l'embout de type luer (51), un élément extracteur (26) s'étendant à partir du coulisseau (22), ledit élément extracteur (26) étant conçu de façon à passer à travers le canal (50) pour élargir l'extrémité antérieure (61) et saisir le fourreau d'aiguille (43) et retirer celle-ci dans le corps (14) lorsque le coulisseau (22) est rétracté.

12. Seringue hypodermique suivant la revendication 11 **caractérisée en ce que** l'extrémité antérieure expansible (61) de l'embout de type luer (51) est constituée d'une pluralité de segments (58) qui sont disposés autour de l'ouverture antérieure du canal (50) à travers l'embout de type luer (51) formant une restriction dudit canal (50) pour empêcher le passage à travers celui-ci de la bague (44) lorsque lesdits segments (58) ne sont pas expansés.

13. Seringue hypodermique suivant la revendication 12 **caractérisée en ce que** l'embout de type luer (51) et les segments (58) sont formés d'une seule pièce avec le corps (14), et les segments (58) sont séparés par des fentes (56) qui s'étendent vers l'intérieur à partir des surfaces antérieures des segments (58), dans une direction longitudinale le long de l'embout de type luer (51), et les segments (58) sont aptes à fermer le passage de la bague (44) lorsqu'ils sont dans un état non expansé.

14. Seringue hypodermique suivant l'une des revendications 12 ou 13 **caractérisée en ce que** le piston (12) comprend des moyens élastiques pour maintenir un embout extracteur antérieur (52) suivant un angle aigu par rapport à un axe central de la cavité (37), cette cavité (37) ayant une longueur suffisante pour recevoir et renfermer l'aiguille (16) lorsque l'extrémité postérieure de celle-ci est maintenue par une portion (42) de manchon d'extracteur, et **en ce que** ladite cavité (37) comprend à une extrémité antérieure, une surface (54) en forme d'entonnoir qui s'étend vers l'intérieur du canal (50).

15. Seringue hypodermique suivant la revendication 14 **caractérisée en ce que** l'élément extracteur (26) comprend une surface d'extracteur postérieure (40) opposée à l'embout extracteur antéricur (52), cette surface d'extracteur postérieure étant inclinée par rapport à un axe de l'embout antérieur (52), et le piston (12) comprend une surface de piston qui s'étend perpendiculairement audit axe central de la cavité (37), et des moyens élastiques maintenant cette surface (40) postérieure contre la surface du piston.

16. Seringue hypodermique suivant la revendication 15 **caractérisée en ce que** l'élément extracteur (26) comprend de plus un manchon extracteur (42) et un bossage extracteur (31), le manchon extracteur (42) s'étendant entre l'embout. extracteur (52) et le bossage extracteur (31), ladite surface d'extracteur postérieure (40) formant un partie du bossage (31), et ledit piston (28) comprenant une partie de piston antérieure élastique s'étendant autour du bossage extracteur (31), le manchon extracteur (42) s'étendant à travers une ouverture de la portion de piston antérieure, cette dernière assurant le maintien de la surface d'extracteur postérieure (40) contre la surface du piston.

17. Seringue hypodermique suivant l'une des revendications 11,12 ou 13 **caractérisée en ce que** la bague (44) constitue une partie d'un collier (42a) fixé sur l'aiguille (16), et un fourreau d'aiguille (43) s'étendant du côté postérieur de la bague (44) qui constitue une partie du collier (42a), le fourreau d'aiguille (43) et la bague (44) étant sur une partie antérieure de l'ensemble à aiguille (17).

18. Seringue hypodermique suivant l'une des revendications 11,12 ou 13 **caractérisée en ce que** la bague (44) forme une partie d'un collier (42a) fixé sur l'aiguille (16), une partie antérieure de celle-ci s'étendant à partir du côté postérieur du collier (42a) et une partie antérieure de l'aiguille s'étendant à partir d'un côté postérieur du collier (42a), cette partie postérieure de l'aiguille (16) formant une partie postérieure de l'ensemble à aiguille (17), et un fourreau (43) s'étendant d'un côté antérieur de la bague (44) forme une partie additionnelle du collier (42a).

19. Seringue hypodermique suivant la revendication 18 **caractérisée en ce que** la partie postérieure de l'ensemble à aiguille (17) comprend une striure (64) destinée à résister au glissement lorsqu'une force de tension est appliquée à ladite partie postérieure de l'aiguille (16).

20. Seringue hypodermique suivant l'une des revendications 11,12 ou 13 **caractérisée en ce qu**'un joint est appliqué à l'intérieur d'un espace annulaire en-

tre l'aiguille (16) et le manchon (18).

21. Seringue hypodermique suivant la revendication 11 **caractérisée en ce qu'**une partic de fixation (20) desdits moyens de couplage (48) de l'aiguille et une partie (46) du manchon (18) sont susceptibles d'être couplées par une rotation relative dans une première direction et d'être désaccouplées par une rotation relative dans une direction opposée, et **en ce que** l'aiguille (16) et le manchon (18) sont susceptibles d'être reliés ensemble de façon amovible à partir de l'extrémité antérieure des moyens de couplage (48) de l'aiguille, à partir de l'extérieur du corps (14).

22. Seringue hypodermique suivant la revendication 11 **caractérisée en ce qu'**elle comporte des moyens de limitation du déplacement du piston pour stopper tout mouvement de celui-ci au-delà de l'extrémité pastérieure du corps.

23. Seringue hypodermique suivant la revendication 1 **caractérisée en ce qu'**elle comporte des moyens d'expansion (106) maintenus radialement à l'intérieur du corps (102) lorsque l'aiguille (105) est positionnée à l'intérieur de celui-ci, lesdits moyens d'expansion (106) s'étendant sur une extrémité postérieure (118) du corps (102) à partir du retrait sur une certaine distance de l'aiguille (105) du corps (102) empêchant ainsi le repositionnement de l'aiguille (105) à l'intérieur du corps.

24. Seringue hypodermique suivant la revendication 23 **caractérisée en ce qu'**elle comporte des moyens (120) pour limiter le retrait de l'aiguille (105) du corps (102) à une certaine distance.

25. Seringue hypodermique suivant la revendication 1 **caractérisée en ce que** l'extracteur (26,126) est mobile à l'intérieur du corps (122) pour être relié à l'ensemble à aiguille (128) et pour tirer celui-ci dans le corps (122), et **en ce qu'**il comporte des moyens (132,134) pour indiquer l'approche d'une connexion entre l'extracteur (126) et l'ensemble à aiguille (128) lorsque l'élément extracteur se déplace vers l'ensemble à aiguille (128).

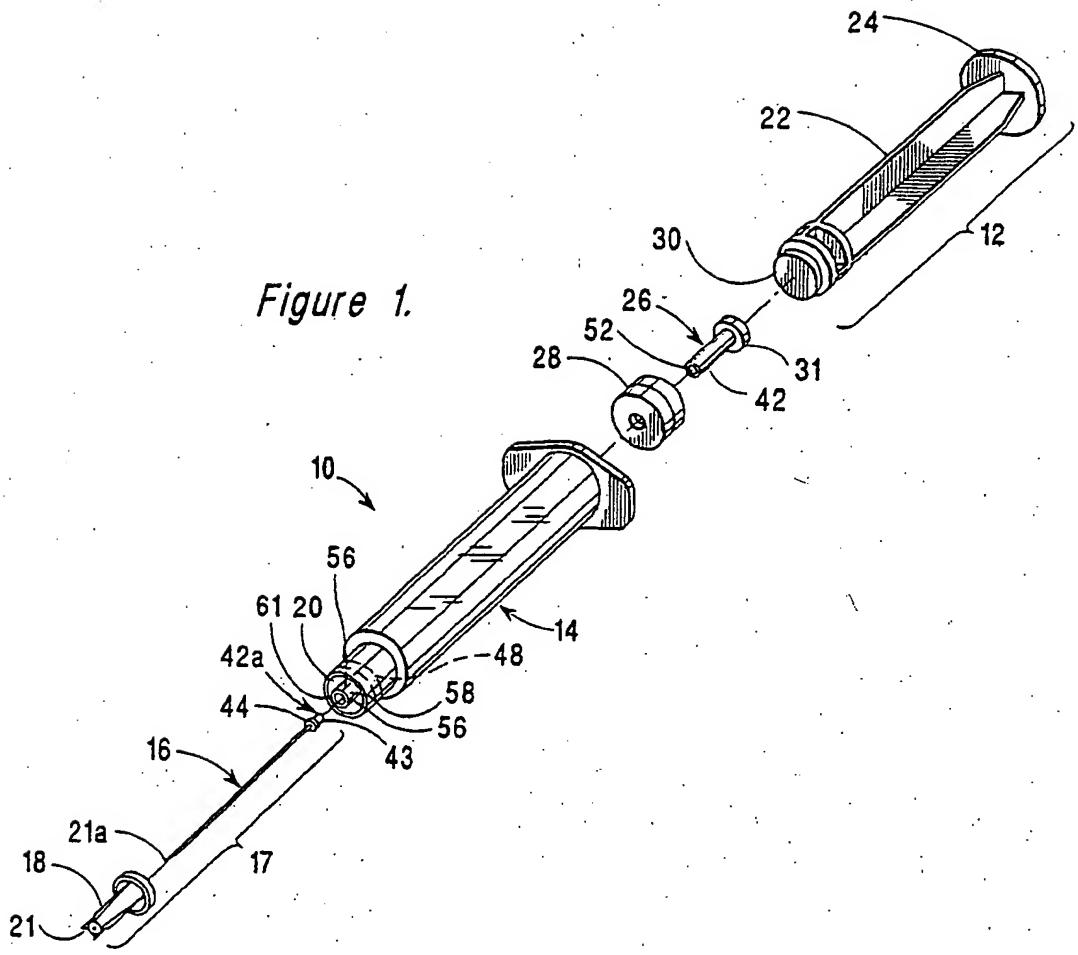

24
22
30
12
26
52
31
28
42
10
56
61
20
14
42a
48
58
44
56
43
16
21a
18
17
21

Figure 1.

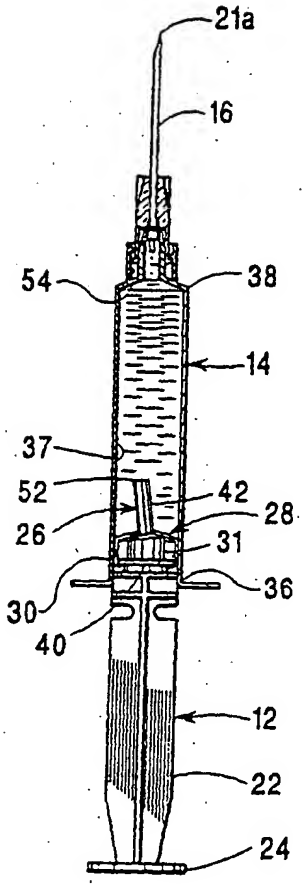


Figure 2.

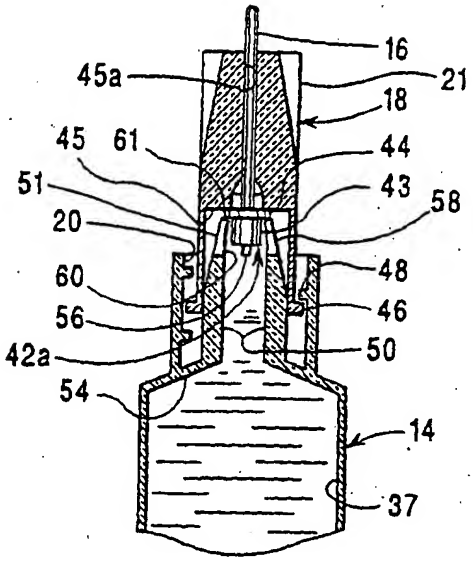


Figure 3.

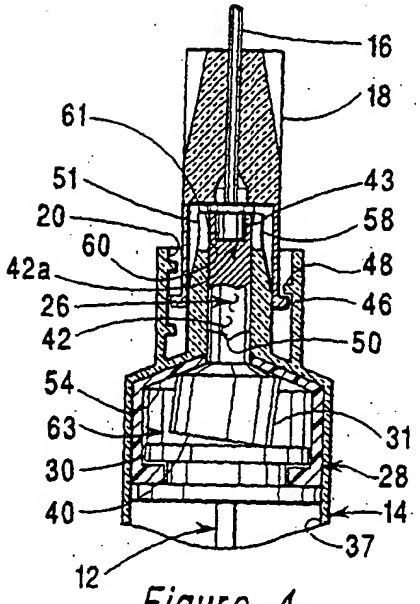


Figure 4.

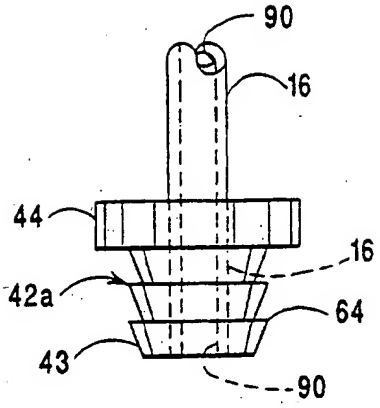
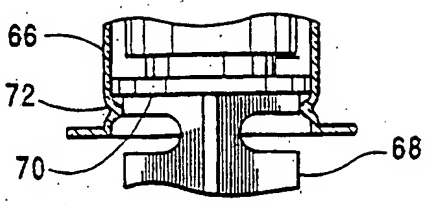


Figure 5.



PRIOR ART

Figure 7.

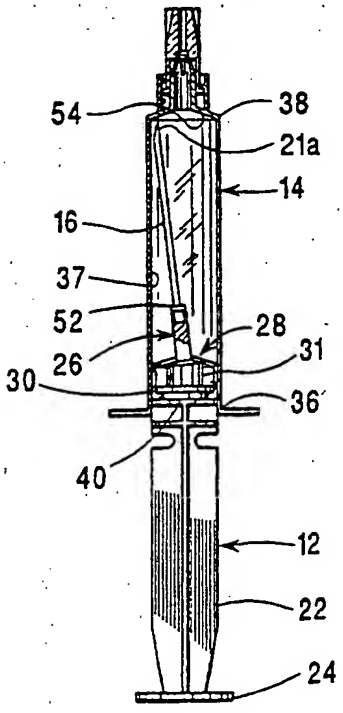


Figure 6.

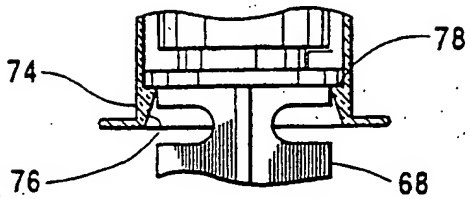


Figure 8.

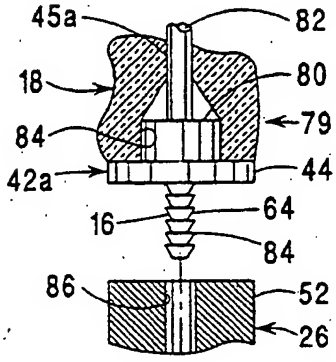


Figure 9.

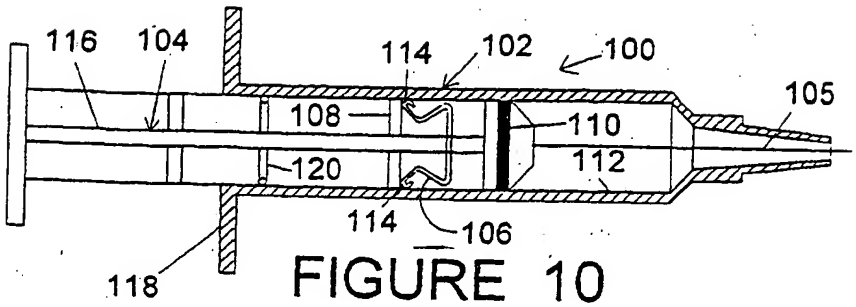


FIGURE 10

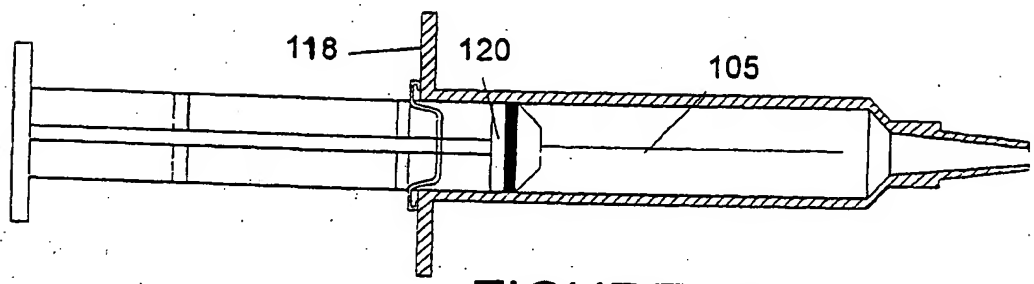


FIGURE 11

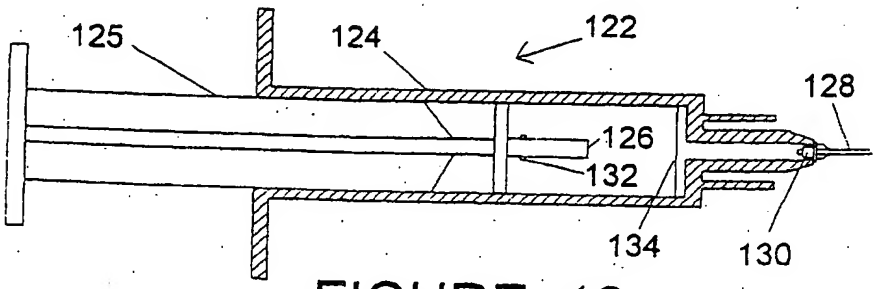


FIGURE 12